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HEARTBEAT MECHANISM

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This invention relates to toys and to sound producing means for simulating the beat of a human heart in said toys.

Various toys have been constructed in the past in which there has been some means for simulating a particular noise within the toy, such as the firing of a gun, the beating of a heart, the ticking of a watch or the playing of certain musical themes. The mechanism in these toys was generally spring wound and adapted to run for a very short period of time. While this made the toys inexpensive to manufacture, it also rendered the pleasure received from these toys of short duration.

It is the object of the present invention to provide an electro-magnetic means for simulating the beats of a human heart and to operate such means through batteries which will last at least six months of continuous running.

It is a further object of the present invention to provide an oscillating balance wheel and staff which will operate in any position of the toy, and which during the oscillation will engage a diaphragm to vibrate said diaphragm and cause sounds which will simulate the beating of a heart.

It is still a further object of the present invention to provide batteries which may be quickly and easily replaced when exhausted and which may be so mounted within the toy that they will serve as weights to assist in maintaining the toy in a desired position such as a sitting position or an erect position.

It is a further object of the present invention to provide a unit containing a balance wheel serving as an oscillating member, a resonant chamber and a vibrating diaphragm attached to said chamber, the oscillation of the balance wheel causing the diaphragm to vibrate and simulate the beating of a human heart.

The invention is illustrated in the accompanying drawing in which:

Figure 1 is a vertical section of the mechanism used in producing the heart beats.

Figure 2 is a section on line 2—2 of Figure 1 looking in the direction of the arrows.

Figure 3 is a view of a simulated toy in the form of a doll showing the location of the heart beat producing mechanism and the batteries.

Referring particularly to the drawings, a housing **9** is formed with a central web **10** supporting an electro-magnet **11** having pole pieces **12** and **13**. The pole pieces **12** and **13** are substantially U-shaped and are formed with yokes **14** and **15** at their free ends. A balance staff **16** journaled at **17** and **18** in the housing and web respectively supports a balance wheel **20** and a hairspring **21**. Also attached to the balance staff is an armature **23** adapted to move between the arms of the yokes **14** and **15**. The batteries **25** and **26**, located at some place in the toy where it will be convenient for replacement and to establish the weight of the batteries in a proper position in the toy, are connected to the

electro-magnet by lead **27** and grounded to the housing by lead **28**.

A resonant chamber **30** is mounted in the lower section of the housing and has protruding therefrom a substantially rigid rod **31**. The rod **31** is attached to a diaphragm **33** by some suitable means such as vulcanizing with rubber as shown at **34** in order to dampen the motion of the rod with respect to the diaphragm. The rod projects from the diaphragm at right angles and in the path of movement of a rectangular cross arm **36**. The rectangular cross arm **36** is slidably mounted in a slot **38** in the balance staff **16** and is positioned so as to engage the end of the rod **31** with the oscillating movement of the balance staff.

The cross arm **36** is formed of two separate sections secured together, a section **39** formed of insulating material and a section **41** formed of conducting material. This cross arm is slidably mounted in the balance staff **16** and is formed with a head **42**, the ends of which may be filed or ground to provide for the adjustment of the cross arm **36** so that the member will be in balance.

The end of the coil **11** is connected by lead **44** to the substantially rigid rod **31** to provide electrical contact between the rigid rod **31** and that portion **41** of the cross arm **36** which contact will energize the coil **11** and impart movement to the armature **23** thus providing with each stroke in a counter-clockwise direction an impulse to the balance wheel while movement in a clockwise direction will cause the rod **31** to be engaged by the insulated portion **39** of the cross arm **36** brushing the rod **31** to one side without making an electrical connection, thus providing impulse to the balance wheel in one direction only.

In the operation the balance wheel is periodically impulsed to provide oscillation to the balance staff **16** which in turn causes the cross arm **36** to engage the rod **31** and to produce a vibration of the diaphragm **33** which in turn produces an audible sound in the chamber **30** which closely simulates the beating of a human heart.

Batteries **25** and **26** mounted in the legs **46** of a doll **48** may be easily replaced by removing a screw cap in the bottom of the feet and inserting the battery in clips which are not shown and which are of the usual construction. The batteries are of the simple pen flashlight type and may be purchased at any store. These batteries should provide sufficient energy to operate such toy for at least a period of six months.

The housing **9** is located approximately as shown in Figure 3 and simulates the beating of a human heart in a toy for periods up to six months without replacement of the batteries, thus giving the illusion of life within the toy.

In operation the device is first energized from the initial rest position shown in Figure 2 and receives an impulse by way of armature **23** driving balance wheel **16** and cross arm **36** in a counterclockwise direction past rod **31**. Balance wheel **20** rotates in a counterclockwise direction until arrested by the resiliency of hairspring **21**. Hairspring **21** is constructed in the conventional manner of an electric clock to prevent rotation of the balance wheel more than 360° in either direction. Upon the return stroke of the balance wheel, cross arm **36** engages rod **31** again brushing it aside out of the path of movement of the cross arm. The resiliency of diaphragm **33** allows rod **31** to flex away and laterally from moving cross arm **36** to permit the cross arm to brush past the rod.

As a result, cross arm **36** imparts movement to rod **31** which movement has a substantial lateral component causing inward moving of diaphragm **33** and compression of the air in resonant chamber **30**. Movement of